

## CLAIMS:

1. A gas turbine engine diffuser comprising a bowl-shaped diffuser casing and a cover nested into the bowl-shaped diffuser casing and cooperating therewith in defining a diffuser passage having a channeled entry portion in fluid flow communication with a vaned exit portion via a vaneless intermediate portion, said channeled entry portion being divided into an array of inlet flowpaths by a first set of vanes, and wherein said vaned exit portion is divided into an array of outlet flowpaths by a second set of vanes.
2. A gas turbine engine diffuser as defined in claim 1, wherein each of said inlet flowpaths has a D-shaped cross-section.
3. A gas turbine engine diffuser as defined in claim 1, wherein said first set of vanes extends integrally from an inner surface of said bowl-shaped diffuser casing, and wherein said cover is provided with a substantially smooth inner surface, wherein each vane of said first set of vanes has a free distal end surface adapted to sealingly engage said substantially smooth inner surface of said cover.
4. A gas turbine engine diffuser as defined in claim 1, wherein said bowl-shaped diffuser casing comprises a machined vaned disc on a first side of which are formed said first set of vanes, said first set of vanes being covered by said cover, said bowl-shaped diffuser casing further comprising a sheet metal outer annular wall extending axially from a radially outer rim of said machined vaned disc on said first side thereof, and a sheet metal inner annular wall mounted concentrically within said sheet metal outer wall, and wherein said second set of vanes is integrated between said sheet metal inner and outer annular walls.
5. A gas turbine engine diffuser as defined in claim 4, wherein said sheet metal outer annular wall includes an arcuate sheet portion united to a straight sheet portion, the arcuate sheet portion having a vaneless inner surface.

6. A gas turbine engine diffuser as defined in claim 4, wherein the vanes of said second set of vanes are made from sheet metal.

7. A gas turbine engine diffuser as defined in claim 1, wherein said bowl-shaped diffuser casing comprises a one-piece casting including a vaned disc on a first side of which are formed said first set of vanes, and an annulus extending from said first side of said vaned disc, said annulus including inner and outer annular walls integrally connected to each other by said second set of vanes.

8. A gas turbine engine diffuser as defined in claim 1, wherein said cover includes a flat annular plate.

9. A gas turbine engine diffuser as defined in claim 8, wherein said vanes of said first set of vanes are circumferentially distributed on a generally radially extending inner surface of said bowl-shaped diffuser casing, and wherein said flat annular plate has a relatively smooth inner surface for closing a series of grooves defined on said inner surface of said bowl-shaped diffuser casing by said first set of vanes.

10. A gas turbine engine diffuser as defined in claim 9, wherein a peripheral ridge extends from an outer surface of said flat annular plate for engagement with an annular inner sidewall of said bowl-shaped diffuser casing.

11. A gas turbine engine diffuser as defined in claim 1, wherein said first set of vanes includes island vanes having machined entrance surfaces.

12. A diffuser for directing a flow of compressed air with a radial component to a diffused annular flow having an axial component, the diffuser comprising:

a diffuser casing including:

a generally radially extending surface having a first array of vanes integrally formed on a rearwardly facing side thereof, and

a generally axially extending annulus projecting rearwardly from a periphery of said radially extending surface, said annulus being provided with a second array of vanes defining a plurality of exit air passages through said annulus; and

a cover adapted to cooperate with said first array of vanes when secured to said diffuser casing in order to define therewith a plurality of entry air passages in communication with said exit air passages.

13. A diffuser as defined in claim 12, wherein said entry air passages have a D-shaped cross-section.

14. A diffuser as defined in claim 12, wherein said diffuser casing has a bowl-shaped, and wherein said cover is adapted to be placed in said bowl-shaped diffuser casing.

15. A diffuser as defined in claim 14, wherein said cover is pressure fitted in said bowl-shaped diffuser casing.

16. A diffuser as defined in claim 12, wherein said first array of vanes includes island vanes having machined surfaces.

17. A diffuser as defined in claim 12, wherein said diffuser casing is a one-piece casting.

18. A diffuser as defined in claim 17, wherein said annulus comprises inner and outer concentric annular walls spaced by said second arrays of vanes.

19. A diffuser as define in claim 18, wherein said cover is in sealing engagement with both said inner annular wall and said first array of vanes.

20. A diffuser as defined in claim 12, wherein there is provided a vaneless arcuate intermediate passage between said entry and exit air passages.
21. A diffuser as defined in claim 20, wherein said vaneless arcuate intermediate passage defines a bend from radial to axial.
22. A diffuser as defined in claim 12, wherein said annulus includes concentric outer and inner sheet metal annular walls, said second array of vanes extending between said outer and said inner sheet metal walls, and wherein said outer sheet metal annular wall is assembled to a machined vaned disc on which is provided said radially extending surface.
23. A diffuser as defined in claim 22, wherein said vanes of said second array of vanes are made of sheet metal.
24. A diffuser as defined in claim 17, wherein said cover is made of sheet metal.
25. A diffuser as defined in claim 24, wherein said cover has a relatively smooth surface of revolution adapted to be secured to a free distal end surface of the vanes of the first array of vanes.
26. A diffuser comprising an integrated opened island diffuser casing having a plurality of island vanes, the opened island diffuser casing being closed by a cover, the island vanes and the cover cooperating to define a plurality of D-shaped entry passages leading to a vaneless annular bend, the vaneless annular bend opening to an annular array of exit passages defined by a set of deswirl vanes.
27. A diffuser as defined in claim 26, wherein said diffuser casing comprises a one-piece casting including a vaned disc on a first side of which are

formed said island vanes, and an annulus extending from said first side of said vaned disc, said annulus including inner and outer annular walls integrally connected to each other by said second set of vanes.

28. A diffuser as defined in claim 26, wherein said diffuser casing comprises a machined vaned disc on a first side of which are formed said island vanes, said island vanes being covered by said cover, said diffuser casing further comprising a sheet metal outer annular wall extending axially from a radially outer rim of said machined vaned disc on said first side thereof, and a sheet metal inner annular wall mounted concentrically within said sheet metal outer wall, and wherein said set of deswirl vanes is integrated between said sheet metal inner and outer annular walls.

29. A method of making a diffuser for directing a flow of compressed air with a radial component to a diffused annular flow having an axial component, the method comprising the steps of: providing a bowl-shaped casing having an annular disc surface provided with a circumferential array of island vanes, and an annulus projecting axially from a periphery of the disc surface, said annulus defining a circumferential array of axially extending exit passages, and securely nesting a cover in said bowl-shaped casing to cooperate with said island vanes to form a circumferential array of generally radially oriented inlet passages in fluid flow communication with said axially extending exit passages.

30. A method as defined in claim 29, wherein said disc surface with said island vanes thereon and said annulus are integrally cast.

31. A method as defined in claim 29, wherein the step of providing said bowl-shaped casing comprises the step of integrating deswirl vanes in said annulus.

32. A method as defined in claim 29, wherein the step of providing said bowl-shaped casing comprises the steps of machining said annular disc surface with

said vane island thereon, forming said annulus by radially bounding a set of deswirl vanes between concentric annular inner and outer sheet metal walls, and securing said annulus to said machined annular disc surface.